

What is claimed is:

- Sub A1
- 1 1. A method of forming copper interconnect, comprising:  
 forming a copper diffusion barrier layer in at least a damascene structure;  
 3 forming a copper layer over the barrier layer;  
 4 removing a portion of the copper layer by chemical mechanical polishing  
 5 with a slurry comprising a chelating organic acid buffer system, colloidal silica,  
 6 and an oxidizer.

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- 2 2. The method of Claim 1, wherein the oxidizer comprises hydrogen peroxide.

- 1 3. The method of Claim 2, wherein the chelating organic acid buffer system  
 2 comprises citric acid and potassium citrate.

- 1 4. The method of Claim 3, wherein the slurry further comprises a corrosion  
 2 inhibitor.

- 1 5. The method of Claim 4, wherein the corrosion inhibitor comprises  
 2 benzotriazole.

- Sub A2
- 1 6. A method of forming copper interconnect, comprising:  
 2 forming a barrier layer over a substrate having at least one trench therein;

- 3 forming a copper seed layer on the surface of the barrier layer;  
4 forming a copper layer over the barrier and seed layers;  
5 removing a portion of the copper layer by chemical mechanical polishing  
6 with a first slurry comprising a chelating organic acid buffer system, colloidal  
7 silica, and an oxidizer; and  
8 removing at least a portion of the barrier layer by chemical mechanical  
9 polishing with a second slurry comprising a chelating organic acid buffer system,  
10 and colloidal silica;  
11 wherein the second slurry is formed without the oxidizer.

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7. The method of Claim 6, wherein the barrier layer comprises tantalum.
- 1 8. The method of Claim 7, wherein the chelating organic acid buffer system  
2 comprises citric acid and potassium citrate.
- 1 9. The method of Claim 8, wherein the oxidizer comprises hydrogen  
2 peroxide.
- 1 10. The method of Claim 9, wherein the first slurry further comprises a  
2 corrosion inhibitor.
- 1 11. The method of Claim 10, wherein the first slurry has a pH in the range of 3  
2 to 6, and the corrosion inhibitor comprises benzotriazole.

1 12. A slurry produced by the process comprising:  
2 combining citric acid, potassium citrate, silica, hydrogen peroxide, and  
3 benzotriazole.

1 13. The slurry produced by the process of Claim 12, wherein a concentration  
2 of citric acid is approximately 3g/l, a concentration of potassium citrate is  
3 approximately 3g/l, a concentration of silica is approximately 5 wt. %, a  
4 concentration of hydrogen peroxide is approximately 3 wt. %, and a  
5 concentration of benzotriazole is approximately 0.015 molar.

1 14. The slurry produced by the process of Claim 13, further comprising  
2 combining the citric acid, potassium citrate, silica, hydrogen peroxide, and  
3 benzotriazole with water.

1 15. A slurry, comprising:  
2 approximately 3 grams/liter of citric acid;  
3 approximately 3 grams/liter of potassium citrate;  
4 approximately 5 wt.% silica;  
5 approximately 3 wt.% hydrogen peroxide;  
6 approximately 0.015 molar benzotriazole; and  
7 the mixture and reaction products thereof.

1 16. The slurry of Claim 15, wherein the slurry has a pH in the range of 3 to 6.

1 17. A slurry formed by the process of combining a organic acid, an organic  
2 acid salt; approximately 5 wt.% silica; approximately 3 wt.% hydrogen peroxide;  
3 and approximately 0.015 molar benzotriazole.

1 18. The slurry of Claim 17, wherein the organic acid comprises acetic acid.

1 19. The slurry of Claim 18, wherein the organic acid salt comprises potassium  
2 acetate.

1 20. The slurry of Claim 17, wherein the organic acid comprises 3 grams/liter of  
2 citric acid, and the organic acid salt comprises 3 grams/liter of potassium citrate.

1 21. A slurry for polishing copper diffusion barriers, comprising:  
2 approximately 3 grams/liter of citric acid;  
3 approximately 3 grams/liter of potassium citrate;  
4 approximately 5 wt.% silica;  
5 approximately 0.015 molar benzotriazole; and  
6 the mixture and reaction products thereof.

1 22. The slurry of Claim 21, wherein the copper diffusion barriers comprise  
2 tantalum.

1 23. The slurry of Claim 21, wherein the slurry has a pH in the range of 3 to 6.

1 24. A slurry for polishing barriers comprised of tantalum, comprising:  
2 organic acid, an organic acid salt, an abrasive, a corrosion inhibitor, and  
3 the mixture and reaction products thereof, and wherein no oxidizer is included.

1 25. The slurry of Claim 24, wherein the organic acid comprise citric acid.

1 26. The slurry of Claim 24, wherein the corrosion inhibitor comprises  
2 benzotriazole, and wherein the slurry has a pH in the range of 3 to 6.

1 27. The slurry of Claim 25, wherein the organic acid salt comprises potassium  
2 citrate.

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